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EXAMINER	
BEKELE, MEKONEN T	

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2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,643	ZIEL, JONATHAN MARK	
	Examiner	**Art Unit**	
	MEKONEN BEKELE	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/27/2005*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-31 are pending in this application.

Priority

2. Applicant's claim for domestic priority under 35 U.S.C 119(e) is Acknowledge based on the provisional application 60/430,396, filed on 12/03/2002

Drawings

3. The Drawings filed on 05/27/2005 are accepted for examination.

Information Disclosure Statement

4. The information discourser statements field on 05/27/2005 in compliance with the provisions of 37 CFR 1.97, and have been considered and copies are enclosed with this Office Action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-19, 21-24 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,993,391 A to Kamiyama,

As to claim 1, Kamiyama teaches A method of generating an image (**col.1 lines1-2, ultrasound diagnostic apparatus which generates an ultrasonic image**), comprising:

emitting ultrasound signals (**col.1 line 30, transmission/reception means to transmit and receive ultrasound,** emitting ultrasound signals **corresponds to transmitting ultrasound signals**);

receiving reflected ultrasound signals (**col. 2 lines 30-31**, **transmit and receive ultrasound to and from a subject to obtain an echo signal.** The reflected ultrasound signals **corresponds to the echo signals);**

converting the reflected ultrasound signals to a stereovision ultrasound image in real time(**col. 2 lines 30-31**, **col.1 lines 8-10**, **a stereoscopic display memory 13(Fig. 8 element 13) converts the echo signal and generates a stereoscopic image (see Fig. 15A and 15 B) at high speed and displays the image)** real time (**col. 1 line 34**);

displaying the stereovision ultrasound image in real time **(Fig. 1 element 9, col.1 lines 21-22, the ultrasound diagnostic apparatus has the advantages of enabling real-time display).**

As to claims 2, 6 and 23, Kamiyama teaches the converting of the reflected ultrasound signals comprises:

generating 3D ultrasound data volumes from the reflected ultrasound signals **(col. 4 lines 1-5, a three–dimension information ultrasound data volumes are obtained from the echo (transmitted) signal.** The 3D ultrasound data volumes **correspond to the three–dimension information);**

and rendering the 3D ultrasound data volumes into first and second 2D images by streaming **(FIG. 15A and FIG. 15B, col.5 lines 8-10, FIG. 15A shows a stereoscopic left-eye image and FIG. 15B shows a stereoscopic right-eye image.** The first and second 2D images **corresponds to FIG. 15A and FIG. 15B respectively. The 2D images are obtained by rending the three–dimension information).**

As to claim 3, Kamiyama teaches adjusting the stereovision ultrasound image in real time (**col.8 lines 30-35, when a stereoscopic image is created using, for example, three to four images, the frame rate of the diagnostic images is decreased to 1/4 to 1/3 of the original rate at most and an image with a depth effect can be displayed in real time.** Adjusting the stereovision ultrasound image **corresponds to decreasing the frame rate of the diagnostic images).**

As to claim 4, Kamiyama teaches updating the stereovision ultrasound image at a rate of greater than or equal to 10 frames per second **(col.9 lines 60-65, col.10 lines 33-34, Kamiyama specifically teaches flash echo imaging method where creating a stereoscopic image from the collected images is obtained by switching the continues scanning at a rate of several tens of frames per second).**

As to claim 5, Kamiyama teaches An ultrasound apparatus **(Abstract, and Fig. 1):**

an emitter (**Fig. 1 element 1, Probe 1)** to emit ultrasound signals;

a receiver (**Fig. 1 element 5, ultrasound receiving section**) to receive reflected ultrasound signals **(col.2 lines 29-30, transmission/reception means to transmit and receive ultrasound to and from a subject to obtain an echo signal and produces an**

ultrasonic image. The ultrasound receiving section receives the echo signal. The reflected ultrasound signals **corresponds to the echo signal);**

a signal processor to convert the reflected ultrasound signals to a stereovision ultrasound image **(col.7 lines 28-32, the stereoscopic display image memory 10 of FIG. 1 does image processing calculations based on the echo signal received from the probe 1.** The signal processor **corresponds to the stereoscopic display image memory 10)** in real time;

a display unit (**Fig.1 element 9**) to display the stereovision ultrasound image in real time (**Fig. 1 element 9, col.1 lines 21-22, the ultrasound diagnostic apparatus has the advantages of enabling real-time display).**

As to claim 7, Kamiyama teaches a transport unit to house (**col.1 lines 36-37, the ultrasound diagnostic apparatus is easy to move to the bedside and carry out examination. Thus apparatus can be moved using movable table)** said emitter(**Fig. 1, Pulser 1**), receiver(**Fig.1. element 5),** display unit (**Fig. 1 element 9**), rendering processor(**Fig. 1 element 13 stereoscopic display memory 13,**) and said generator(**Fig. 1 element 8.,col.6 lines 48-80, The memory synthesizing section 8 arranges the images and setting parameters or superposes them to produce a video signal and output the signal.** The generator **corresponds to the memory synthesizing section 8**).

As to claim 8, Kamiyama teaches said transport unit is a cart **(col.1 lines 36-37, the ultrasound diagnostic apparatus is easy to move to the bedside. Thus apparatus can be transported using a movable table such as a cart).**

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As to claim 9, Kamiyama teaches said display unit further comprises a control unit to control the stereovision ultrasound image in real time (**col.8 lines 50-55, a time-division stereoscopic television system where a right image and a left image are presented alternately in the field period t of the display 21 and the liquid-crystal shutter glasses 20 are opened and closed in synchronism with the alternation to provide stereoscopic vision.** The control unit **corresponds to the liquid-crystal shutter glasses).**

As to claim 10, Kamiyama teaches the stereovision ultrasound image is updated at a rate of greater than or equal to 20 frames per second **(col.9 lines 60-65, col.10 lines 33-34, Kamiyama specifically teaches flash echo imaging method where creating a stereoscopic image from the collected images is obtained by switching the continues scanning at a rate of several tens of frames per second).**

As to claim 11, Kamiyama teaches the 3D ultrasound data volumes comprise first and second 3D data volumes **(col. 4 lines 1-5, the right eye and left eye three–dimension information** corresponds to first and second 3D data volumes), and said rendering processor (**Fig. 8 element 13: stereoscopic display memory 13, the stereoscopic display memory transform three–dimension information into two-dimensional tomographic images.** The rendering processor **corresponds to the stereoscopic display memory);**

renders the first and second 3D data volumes into the first and second 2D images, respectively **(FIG. 15A and FIG. 15B, col.5 lines 8-10, FIG. 15A shows a stereoscopic left-eye image and FIG. 15B shows a stereoscopic right-eye image.** The first and second 2D images **corresponds to FIG. 15A and FIG. 15B respectively. The FIG. 15A**

and FIG. 15B are constricted by using the three-dimensional right and left eyes images information).

As to claim 12, Kamiyama teaches a select unit to alternately transmit the first and second 2D images to said display unit to display the stereovision ultrasound image(**col.8 lines 50-55, a time-division stereoscopic television system where a right image and a left image are presented alternately in the field period t of the display 21 and the liquid-crystal shutter glasses 20 are opened and closed in synchronism with the alternation to provide stereoscopic vision.** The first and second 2D images **correspond to right image and a left image,** the select unit **corresponds to the liquid-crystal shutter glasses).**

As to claim 13, Kamiyama teaches a user views the stereovision ultrasound image through shuttered glasses (**Fig.7 element 20, the liquid-crystal shutter glasses).**

As to claim 14, Kamiyama teaches said display unit tracks an eye movement of a user to create the stereovision ultrasound image (**Fig.1, col.8 lines 27-29, the stereoscopic display image memory 10 synthesizes the received images one after another and supplies the resulting images to the display section 9.** Thus the display unit tracks the movement of the eye. The display unit **corresponds to the display section 9).**

As to claim 15, Kamiyama teaches said rendering processor continuously streams the 3D ultrasound data volumes (**Fig.1, col.8 lines 27-29, the stereoscopic display image memory 10 synthesizes the received images one after another and supplies the resulting images to the display section. Thus memory 10 receives the right and**

left eyes three–dimension information continuously in real time. The rendering processor **corresponds to stereoscopic display image memory 10).**

As to claim 16, Kamiyama teaches a user views the stereovision ultrasound image, and the stereovision ultrasound image changes corresponding to a movement of the user (**Fig. 17, col.10 lines 65-67, col. 11 lines 1-3, Kamiyama specifically teaches flash echo imaging ultrasound stereovision system where the system is designed for the operator (not shown) to perform a manual operation. Thus the stereovision ultrasound image changes when operator operates the power button101).**

As to claim 17, Kamiyama teaches the user views the stereovision ultrasound image through a virtual reality viewing unit (**Fig. 1 element 9 Display section corresponds to** the virtual reality viewing unit) connectible to the display unit to change the stereovision ultrasound image in accordance with the movement of the user**(Fig. 17, col.10 lines 65-67, col. 11 lines 1-3,** Kamiyama **specifically teaches flash echo imaging ultrasound stereovision system where the system is designed for the operator (not shown) to perform a manual operation. Thus the stereovision ultrasound image changes when operator operates the power button101**);

As to claim 18, Kamiyama teaches said rendering processor renders the first and second 3D data volumes in series (**Claim 9**, **Fig.1**, **col.8 lines 27-29, the stereoscopic display image memory 10 synthesizes the received images one after another and supplies the resulting images to the display section a time-division manner. Thus the memory 10 receives the right and left eyes three–dimension information**

continuously and displays the 2D two-dimensional tomographic images in the time-division manner (in series)**).**

As to claim 19, Kamiyama teaches said rendering processor comprises left and right rendering processors to render the first and second 3D data volumes, respectively in parallel (**claim 8, Fig.15A and Fig. 15 B, The stereoscopic display image memory 10 synthesizes the received three–dimension information supplies the resulting images to the display section. The display section displays the right-eye image and said left-eye image side by side** (parallel)**).**

As to claims 21 and 24, Kamiyama teaches said emitter and said receiver comprise a two-dimensional phased array transducer (**Fig. 1, col. 6 lines 14-20, an array probe 1 has a plurality of piezoelectric vibrators acting as electromechanical reversible transducer elements. The echo signal the probe 1 outputs channel by channel is supplied to an ultrasound receiving section 5 according to the timing of the rate pulse. Further two-dimensional array probe 30(Fig. 8 element 30) can be used in place of the array probe 1 to obtain plurality of tomographic images rapidly (col. 9 lines 15-20).** The two-dimensional phased array transducer **corresponds to the two-dimensional array probe 30).**

As to claim 22, Kamiyama teaches An ultrasound apparatus **(Abstract, Fig. 1):**

an emitter (**Fig. 1 element 1, Probe 1)** to emit ultrasound signals;

a receiver (**Fig. 1 element 5, ultrasound receiving section**) to receive reflected ultrasound signals **(col.2 lines 29-30, transmission/reception means to transmit and receive ultrasound to and from a subject to obtain an echo signal and produces an ultrasonic image. The ultrasound receiving section**

receives the echo signal. The reflected ultrasound signals **corresponds to the echo signal);**

a signal processor to convert the reflected ultrasound signals to a stereovision ultrasound image **(col.7 lines 28-32, the stereoscopic display image memory 10 of FIG. 1 does image processing calculations based on the echo signal received from the probe 1.** The signal processor **corresponds to the stereoscopic display image memory 10)** in real time;

a display unit (**Fig.1 element 9**)to display the stereovision ultrasound image in real time (**Fig. 1 element 9, col.1 lines 21-22, the ultrasound diagnostic apparatus has the advantages of enabling real-time display);**

a transport unit to house **(col.1 lines 36-37, the ultrasound diagnostic apparatus is easy to move to the bedside. Thus apparatus can be transported using a movable table such as a cart)** said emitter, receiver, signal processor and said display unit.

As to claim 31, Kamiyama teaches updating the stereovision ultrasound image at a latency of less than or equal to 200 milliseconds from start of acquisition to display (**col.7 lines 22-23, the time required to acquire three-dimensional data items is 100 msec to 300 msec at most).**

Claim Rejections - 35 USC § 103

The following is a quotation of the 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained thought the invention is not identically disclosed or described as set forth in section 102 of this title, if the difference between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. *Claims 20 and 25-30 are rejected under 35 U.S.C 103(a) as being unpatentable over Kamiyama, US Patent No. 5993391 A, published on 11/30/1999, in view of Weiglhofer et al., [hereafter Weiglhofer] US Patent No. US 6980210 B1 filed on 11/24/1998.*

As to claim 20, Kamiyama does not specifically teaches "said select unit is a multiplexer" although Kamiyama suggests **a time-division stereoscopic television system where a right image and a left image are presented alternately in the field period t of the display 21 and the liquid-crystal shutter glasses 20 are opened and closed in synchronism with the alternation to provide stereoscopic vision.** The multiplexer **corresponds to the liquid-crystal shutter glasses (col. 6 lines 14-20).**

On the other hand the 3D real time stereoscopic image processing system of Weiglhofe teaches a multiplexer (**Fig. 4A**).

It would have been obvious to one the ordinary skill in the art at the time of applicant's invention was made to incorporate the 3D stereo real-time sensor system, method and computer program of Weiglhofer into the Ultrasound diagnostic apparatus capable of displaying ultrasound diagnostic images with a three-dimensional effect of Kamiyama, because both Weiglhofer and Kamiyama are directed to 3D stereoscopic image processing with depth effect (Weiglhofer: abstract, Kamiyama: col.2 lines 22-25 and both Weiglhofer and Kamiyama are in the same field of endeavor.

One of ordinary skill in the art at the time the applicant's invention was made to incorporate the multiplexer MUX1 of Weiglhofer into the Ultrasound diagnostic apparatus of Kamiyama, because that would have allowed user of Kamiyama to attain depth information with little expense and in real time (Weiglhofer:Abstract

As to claim 25, Kamiyama teaches An ultrasound apparatus (**Fig. 1**), comprising a transducer to emit ultrasound signals and to receive reflected ultrasound signal(**Fig. 1, col. 6 lines 14-20, an array probe 1 has a plurality of piezoelectric vibrators acting as electromechanical reversible transducer elements. The echo signal the probe 1 outputs channel by channel is supplied to an ultrasound receiving section 5 according to the timing of the rate pulse. Thus the array probe 1 corresponds to** the transducer);

a rendering processor to render the stream of detected ultrasound data volumes into first and second 2D rendered images **(FIG. 15A and FIG. 15B, col.5 lines 8-10, FIG. 15A shows a stereoscopic left-eye image and FIG. 15B shows a stereoscopic right-eye image.** The first and second 2D images **corresponds to FIG. 15A and FIG. 15B respectively. The FIG. 15A and FIG. 15B are constricted by using the three-dimensional right and left eyes images information.** The ultrasound data volumes **correspond to three-dimensional right and left eyes images information**);

first and second buffers(**Fig. 1 element 8, Memory combining section**) to hold the first and second 2D rendered images, respectively**(col. 6 lines 48-52, The memory synthesizing section 8 arranges the images and setting parameters or superposes them to produce a video signal and output the signal);**

display unit (**Fig. 1 element 9, col. 6 line 52)*;***

However it is noted that Kamiyama does not specifically teaches “a multiplexer to alternately transmit the first and second 2D rendered images to the display unit to generate a stereovision ultrasound image in real time” ,although Kamiyama suggests **a time-division stereoscopic television system where a right image and a left image are presented alternately in the field period t of the display 21 and the liquid-crystal shutter glasses 20 are opened and closed in synchronism with the alternation to**

provide stereoscopic vision. The first and second 2D images **correspond to right image and a left image.** The multiplexer **corresponds to the liquid-crystal shutter glasses, col. 6 lines 14-20);**

On the other hand the 3D real time stereoscopic image processing system of Weiglhofe teaches a multiplexer (**Fig. 4A**) to alternately transmit the first and second 2D rendered images to the display unit to generate a stereovision ultrasound image in real time (**col. 13 lines 21-24, a multiplexer unit (MUX1) which outputs that value pair of the input signal values in real time (Abstract)).**

It would have been obvious to one the ordinary skill in the art at the time of applicant's invention was made to incorporate the 3D stereo real-time sensor system, method and computer program of Weiglhofer into the Ultrasound diagnostic apparatus capable of displaying ultrasound diagnostic images with a three-dimensional effect of Kamiyama, because both Weiglhofer and Kamiyama are directed to 3D stereoscopic image processing with depth effect (Weiglhofer: abstract, Kamiyama: col.2 lines 22-25 and both Weiglhofer and Kamiyama are in the same field of endeavor.

One of ordinary skill in the art at the time the applicant's invention was made to incorporate the multiplexer MUX1 of Weiglhofer into the Ultrasound diagnostic apparatus of Kamiyama, because that would have allowed user of Kamiyama to attain depth information with little expense and in real time (Weiglhofer:Abstract

As to claim 26, Kamiyama teaches a cart to house **(col.1 lines 36-37, the ultrasound diagnostic apparatus is easy to move to the bedside. Thus apparatus can be transported using a movable table such as a cart)** said transducer (**Fig.1 element 1, the Array Probe**), scanner(**Fig. 3 element 1, col. 3 lines 5-7, FIG. 3 shows an example of creating a stereoscopic image when scanning is effected at**

regular intervals), rendering processor **(Fig. 1 element 13 stereoscopic display memory 13),** first and second buffers (**Fig. 1 element 8, Memory combining section**), and said display unit (**Fig. 1 element 9, col. 6 line 52)**.

However it is noted that Kamiyama does not specifically teaches "a multiplexer"

On the other hand the 3D real time stereoscopic image processing system of Weiglhofe teaches a multiplexer (**Fig. 4A).**

As to claim 27, Kamiyama teaches rendering processor renders the stream of detected ultrasound data volumes by streaming (**Fig.1, col.8 lines 27-29 the stereoscopic display image memory 10 synthesizes the received images one after another and supplies the resulting images to the display section. Thus memory 10 receives the right eye and left eye three–dimension information continuously in real time.** The rendering processor **corresponds to stereoscopic display image memory 10**).

As to claim 28, Kamiyama teaches the stereovision ultrasound image is a Color Flow Mode (CFM) image **(col. 9 lines 22-23).**

As to claim 29, Kamiyama the stereovision ultrasound image is a Power Doppler image (col. 1 lines 38-42, **the ultrasound diagnostic apparatus is also capable of displaying the speed distribution of the bloodstream moving toward (or away from) the vibrators in the Doppler ultrasonography or the distribution of power values of the blood echo signal in the power Doppler method).**

As to claim 30, Kamiyama the stereovision ultrasound image is an Acoustic Quantification (AQ) image **(col. 3 lines 50-55, Fig. 18A, Fig. 18 B, FIG. 18A is a color photograph showing a display example of an image for the left eye by an flash echo imaging method.** The Quantification (AQ) image **corresponds to Fig. 18A and Fig. 18B**).

Conclusion

The Prior art made of record

1. US Patent No. 5993391 A
2. US Patent No. 6980210 B1

The prior art made of record and not relied up on is considered pertinent to applicant's disclosure

1. US Pub. No. 20010007919 A1
2. US Patent No. 20020041327
3. US Patent No. 5917937 A
4. US Patent No. 6,436,049
5. Hernandez et al. "Stereoscopic visualization of three-dimensional ultrasonic data applied to breast tumors" European Journal of Ultrasound 8 (1998) page 51
6. Dautraix et al. "A STEREOSCOPIC DISPLAY OF 3D ULTRASONIC DATA: THE STEREOECHOGRAPHY" 1992 IEEE ULTRASONICS SYMPOSIUM, pp 1133-1136

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Mekonen Bekele whose telephone number is 571-270-3915. The examiner can normally be reached on Monday -Friday from 8:00AM to 5:50 PM Eastern Time.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor LE BRIAN can be reached on **(571) 272-7424.** The fax phone number for the organization where the application or proceeding is assigned is 571-237-8300. Information regarding the status of an application may be obtained from the patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.

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/MEKONEN BEKELE/
Examiner, Art Unit 2624
August 11, 2008

/Brian Q Le/

Examiner, Art Unit 2624